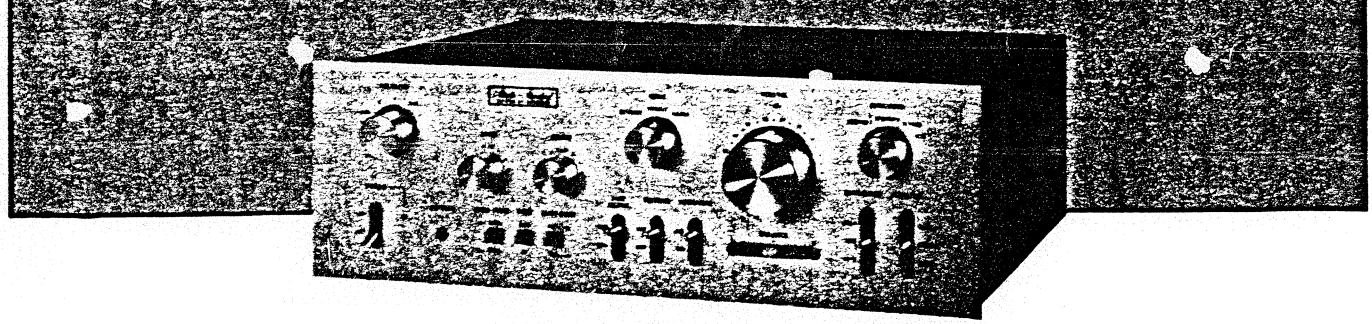
SERVICE MANUAL

FISHER

CA-2310

Stereo Amplifier

(EUROPE)



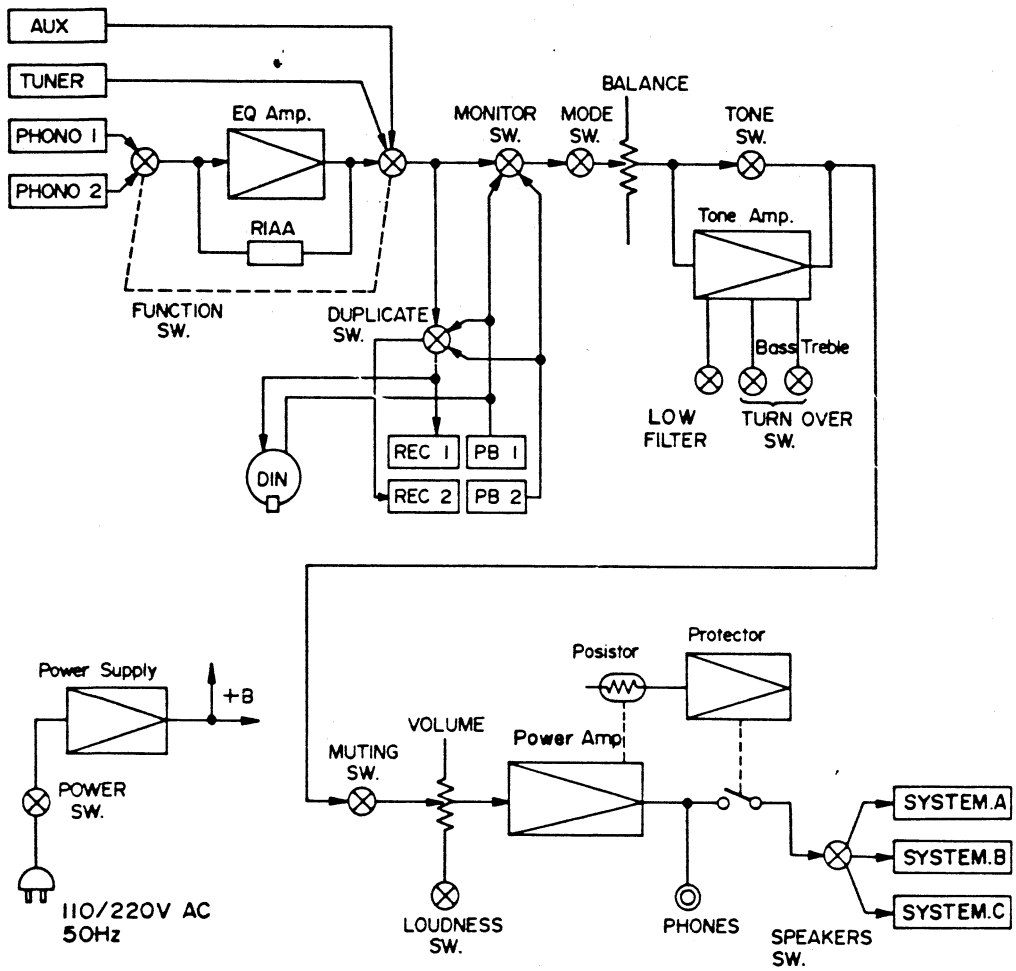
The first name in high fidelity

Nominal Specifications for Information Only.

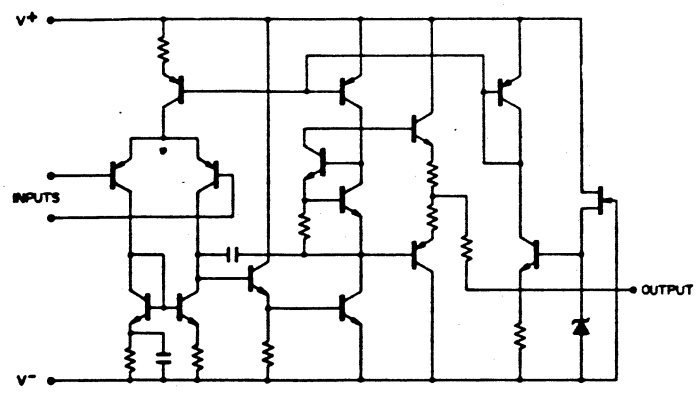
AMPLIFIER		CA2310
POWER AMPLIFIER SECTION Continuous RMS sine wave power per channel within stated bandwidth at no more than stated distortion and with an 8 ohm load		70watts
Power Band Width		20Hz-20kHz
Total Harmonic Distortion		0.05%
IM Distortion		0.05%
Speaker Damping		40
PREAMPLIFIER SECTION Frequency Response	Phono (30Hz-15kHz) Aux (20Hz-20kHz)	±1.0dB ±1.0dB
Input Sensitivity and Impedance	Phono 1	2mV/50k ohm
	Phono 2	2mV/50k ohm
	Tape Monitor 1 Tape Monitor 2	150mV/100k ohm 150mV/100k ohm
	Tuner Auxiliary	150mV/100k ohm 150mV/100k ohm
Phono Max. Input Capability		220mV
Tone Control	Bass (100Hz) Treble (10kHz) Turnover (Bass) Turnover (Treble)	±10dB ±10dB 200Hz/400Hz 3kHz/6kHz
Filter	Low at 16Hz (12dB/Oct.)	10dB
Loudness Contour (100Hz/10kHz)		+8dB/+4dB
Hum and Noise (IHF Short Circuit, A Net Work)	Phono 1, 2 Tape Monitor Tuner Auxiliary	78dB 100dB 100dB 100dB
Output Level and Impedance	Tape 1, 2	150mV/600ohm
GENERAL Power Requirements		110/220 V AC ±10% 460W/552VA
Dimensions (WxDxH)		17-1/2"x14-13/16"x5-15/16"
Weight		31.9 lbs.

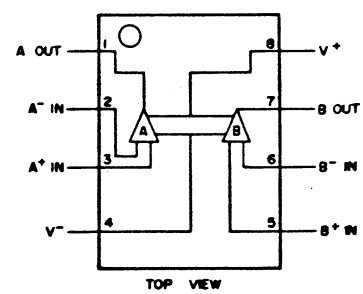
Because Fisher products are subject to continuous improvement, Fisher reserves the right to modify, change, or alter any design or specifications without notice and without incurring any obligation. Fisher reserves the right to make changes and improvements upon its products without any obligation to install such changes upon any of its products previously manufactured.

FUNCTIONAL BLOCK DIAGRAM

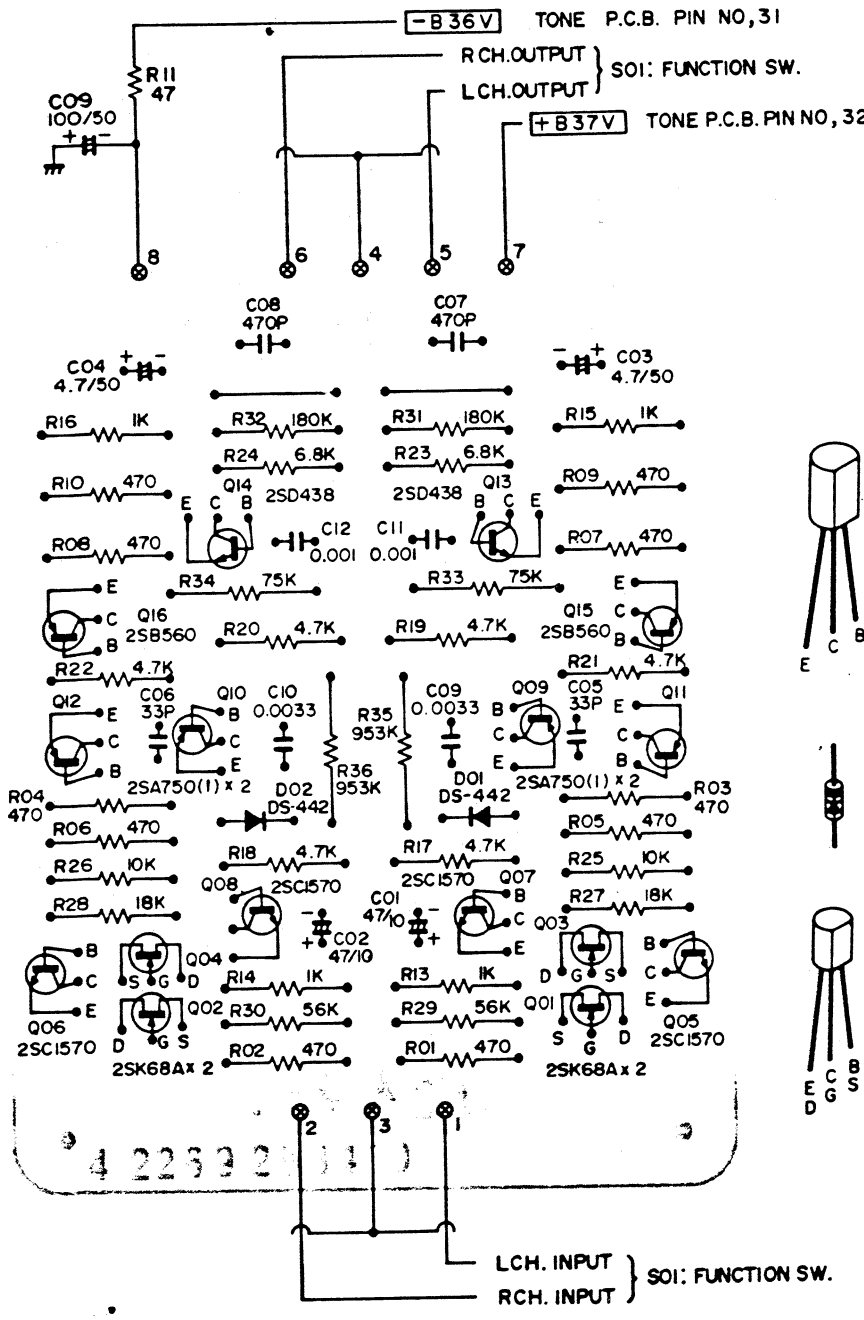


ONE AMP IC NJM4558 EQUIVALENT CIRCUIT





EQ AMP P.C.BOARD



BOTTOM VIEW

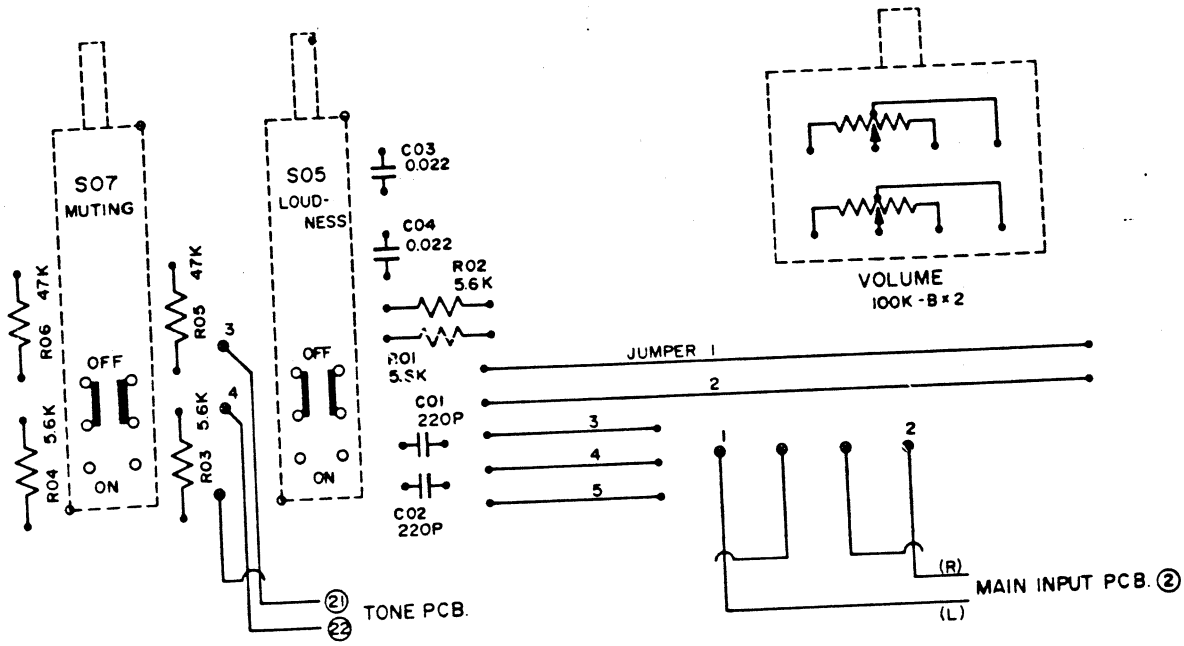
TRANSISTOR DC VOLTAGES				
SYMBOL NO.	DEVICE	B, S	C, G	E, D
Q01, 02	2SK68A	0V	-22.5V	
Q03, 04	2SK68A	0V	-22.5V	
Q05, 06	2SC1570	+11.5V	+31.3V	
Q07, 08	2SC1570	+11.5V	+34.8V	
Q09, 10	2SA750	+34.8V	+31.3V	+34.8V
Q11, 12	2SA750	+31.3V	+14.5V	+31.9V
Q13, 14	2SD438	-31.0V	0V	-31.6V

PARTS LIST

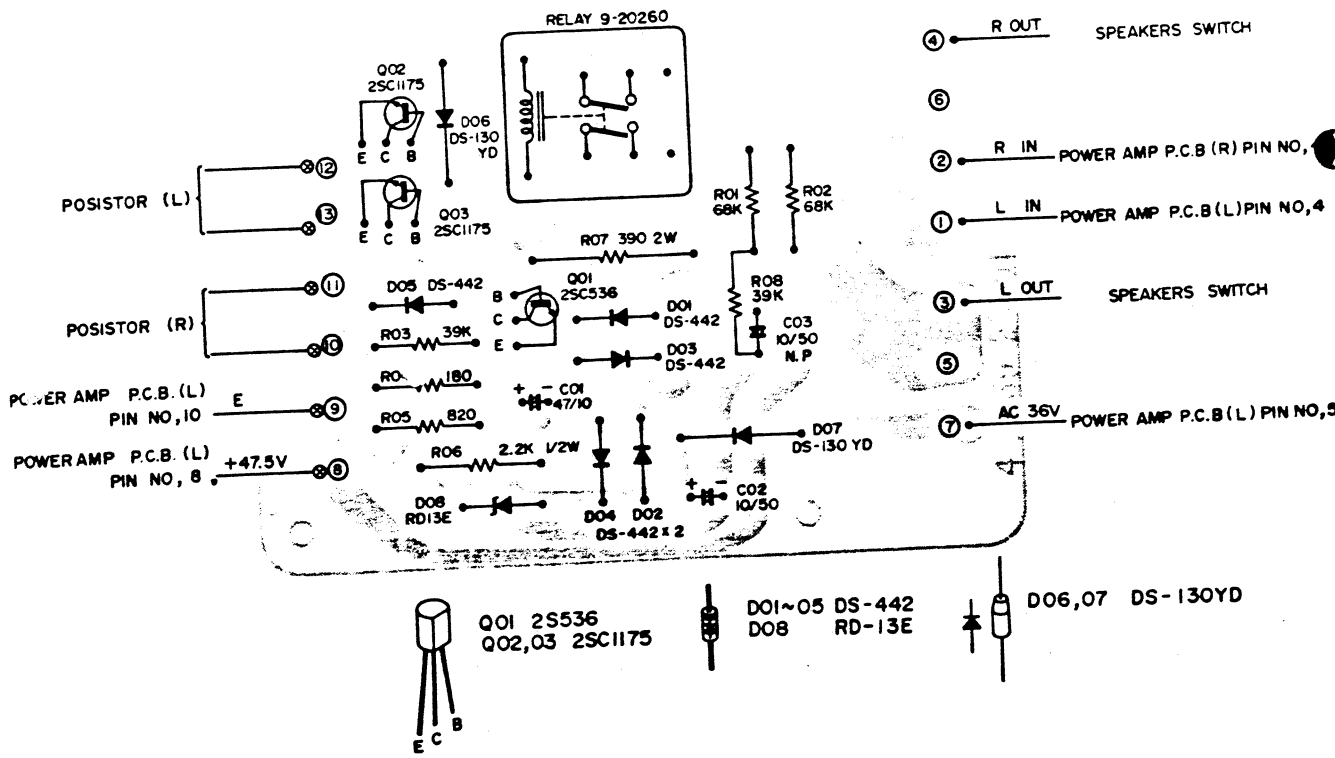
EQ AMP PCB Assy
1310 4001 77300

Ref. No.	Parts Number	Description		
	CAPACITORS			
C01,02	C1ARE-476AL	Electrolytic 47 μF	10V	
C03,04	C1HRE-475AL	Electrolytic 4.7 μF	50V	
C05,06	C1HCDK330SL	Ceramic 33pF	50V	±10 %
C07,08	C1HCSK471SL	Ceramic 470pF	50V	±10 %
C09,10	4 2239 21030	Mylar 0.0033 μF	100V	±2 %
C11,12	4 2239 21031	Mylar 0.001 μF	100V	±2 %
	SEMICONDUCTORS			
D01,02	2055 9040 44210	Diode DS-442		
Q01,02 03,04	TNN-2SK68A--L	TR 2SK68A		
Q05,06 07,08	2035 5151 57079	TR 2SC1570LG		
Q09,10 11,12	TNN-2SA7501-E	TR 2SA750 (1) E		
Q13,14	2035 6920 43840	TR 2SD438D		
Q15,16	2035 6930 56040	TR 2SB560D		
	RESISTORS			
R01,02 03,04 05,06 07,08 09,10	R2EDSJ471A	Carbon 470	1/4W	±5 %
R13,14 15,16	R2EDSJ102A	Carbon 1k	1/4W	±5 %
R17,18 19,20 21,22	R2EDSJ472A	Carbon 4.7k	1/4W	±5 %
R23,24	R2EDSJ682A	Carbon 6.8k	1/4W	±5 %
R25,26	R2EDSJ103A	Carbon 10k	1/4W	±5 %
R27,28	R2EDSJ183A	Carbon 18k	1/4W	±5 %
R29,30	R2EDSJ563A	Carbon 56k	1/4W	±5 %
R31,32	R2EDSJ184A	Carbon 180k	1/4W	±5 %
R33,34	4 2219 20400	Metal Film 75k	1/2W	±2 %
R35,36	4 2219 20410	Metal Film 953k	1/2W	±2 %

LOUDNESS & MUTING/VOLUME P.C.BOARD

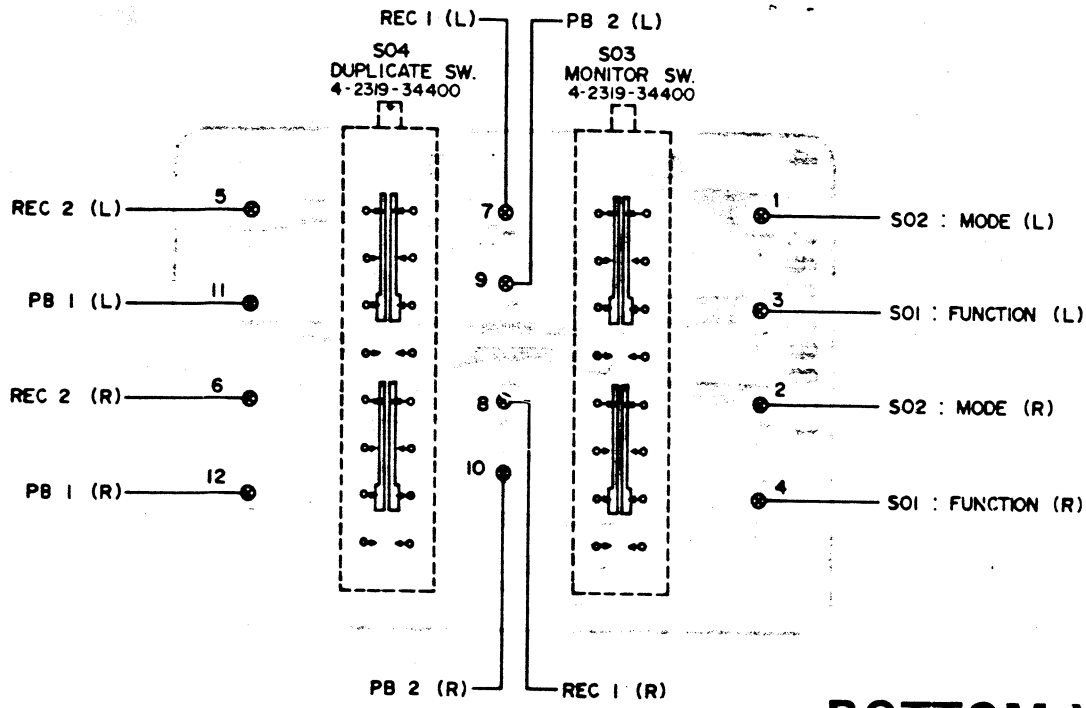


PROTECTOR P.C.BOARD



BOTTOM VIEW

TAPE SWITCH P.C.BOARD



BOTTOM VIEW

PARTS LIST

)UDNESS & MUTING PCB Assy
10 4001 80500

f. No.	Parts Number	Description		
5,07	4 2312 00020	SW Lever 6P (Loudness & Muting)		
	CAPACITORS			
1,02	C1HCSK221SL	Ceramic 220pF	50V	±10 %
3,04	C1HFAK223A	Mylar 0.022 μF	50V	±10 %
	RESISTORS			
1,02	R2EDSJ562A	Carbon 5.6k	1/4W	±5 %
3,04				
5,06	R2EDSJ473A	Carbon 47k	1/4W	±5 %

)LUME PCB Assy
0 4001 80400

. No.	Parts Number	Description
	4 2229 25720	Volume 100k-Bx2

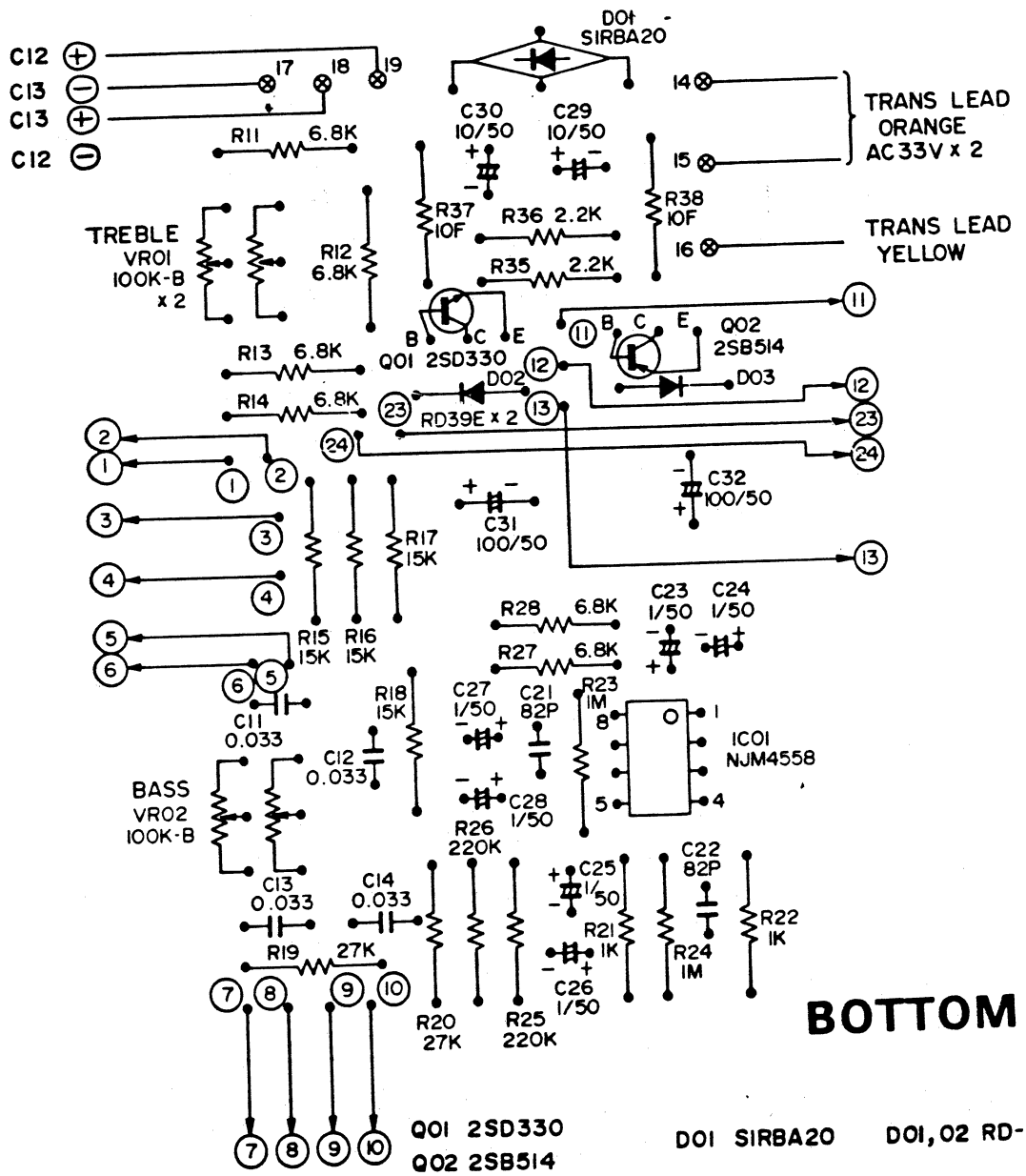
PE SWITCH PCB Assy
0 4001 77500

. No.	Parts Number	Description	
3,04	4 2319 34400	SW Lever 16P & Duplicate)	(Monitor

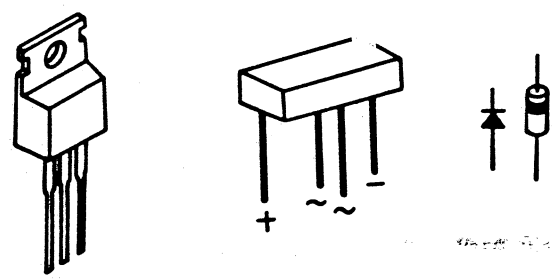
PROTECTOR PCB Assy
1310 4001 77401

Ref. No.	Parts Number	Description		
	4 2329 20260	Relay		
	CAPACITORS			
C01	C1ARB-476A	Electrolytic 47 μF	10V	
C02,03	C1HAB-106A	Electrolytic 10 μF	50V	
	SEMICONDUCTORS			
D01,02 03,04 05	2055 9040 44210	Diode DS-442		
D06,07	2025 2310 13020	Diode DS-130Yυ		
D08	DNN-RD13E	Diode RD-13E		
Q01	2035 5100 53660	TR 2SC536F		
Q02,03	2035 6701 17550	TR 2SC1175E		
	RESISTORS			
R01,02	R2EDSJ683A	Carbon 68k	1/4W	±5 %
R03,08	R2EDSJ393A	Carbon 39k	1/4W	±5 %
R04	R2EDSJ181A	Carbon 180	1/4W	±5 %
R05	R2EDSJ821A	Carbon 820	1/4W	±5 %
R06	R2HDPJ222A	Carbon 2.2k	1/2W	±5 %
R07	R3DXAK391A	Oxide Metal Film 390	2W	±10 %

TONE AMP P.C.BOARD(1/2)

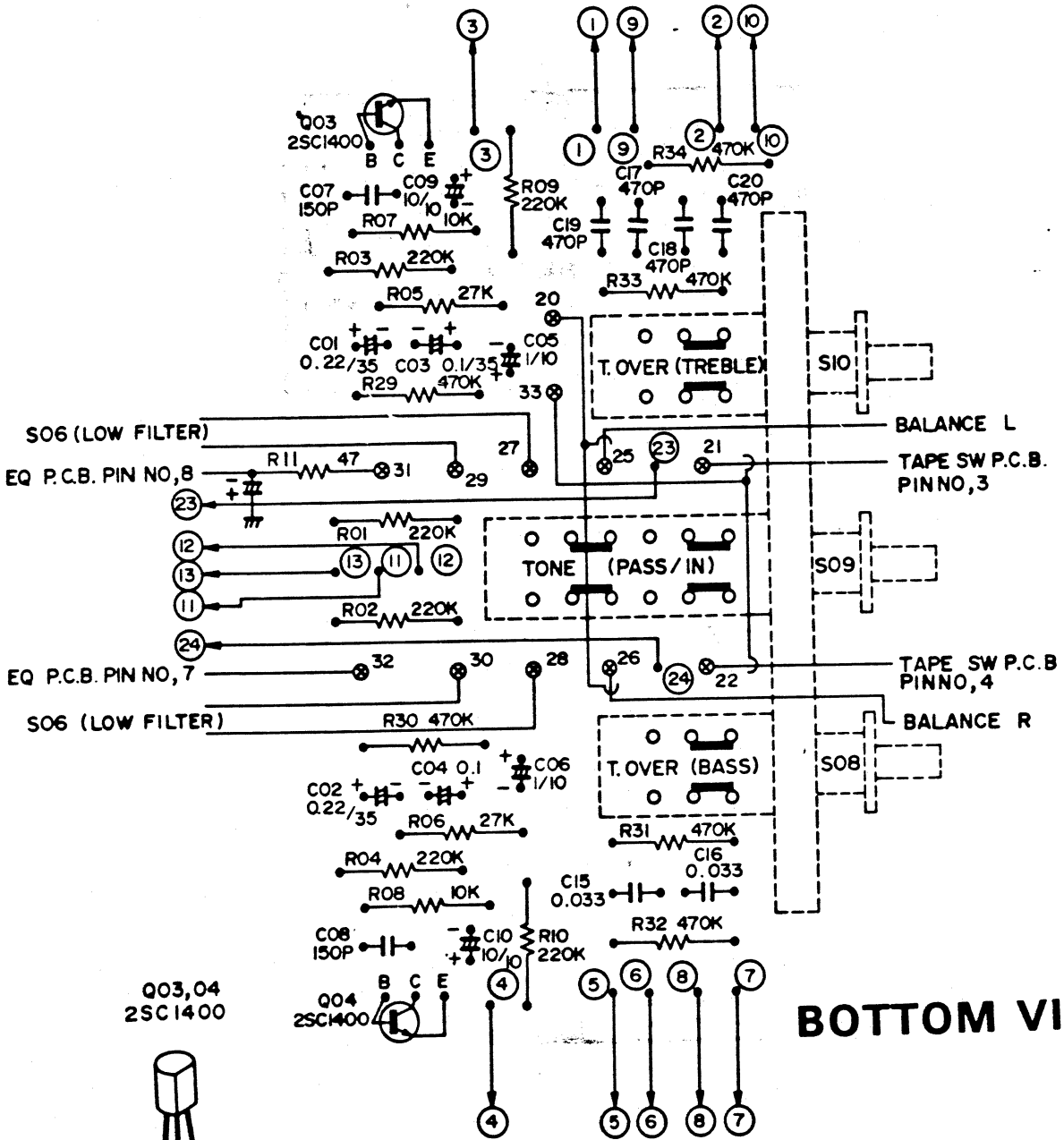


BOTTOM VIEW

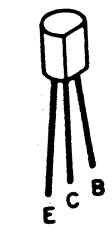


TONE AMP IC PIN NUMBERS VOLTAGES								
DEVICE \ IC PIN NO.	1	2	3	4	5	6	7	8
IC NJM4558P	0V	0V	0V	-13V	0V	0V	0V	+13V

TONE AMP & TURN OVER SWITCH P.C.BOARD(2/2



Q03,04
2SC1400



TRANSISTOR DC VOLTAGES				
SYMBOL NO.	DEVICE	B	C	E
Q01	2SD330	+37.6V	+45.0V	+37.0V
Q02	2SB514	−37.6V	−45.0V	−37.0V
Q03, 04	2SC1400	−0.8V	+36.0V	−1.5V

PARTS LIST

TONE AMP & TURN OVER SWITCH PCB Assy
1310 4001 77601

Ref. No.	Parts Number	Description		
	4 2229 25730	Volume (Bass/Treble)		
	4 2319 34410	SW Push 3Key		
	CAPACITORS			
C01,02	C1VTRK224A	Tantalum 0.22 μF	35V	±10 %
C03,04	C1VTRM104A	Tantalum 0.1 μF	35V	±20 %
C05,06	C1ARB-105A	Electrolytic 1 μF	10V	
C07,08	C1HCDK151SL	Ceramic 150pF	50V	±10 %
C09,10	C1ARB-106A	Electrolytic 10 μF	10V	
C11,12 13,14 15,16	C1HFAK333A	Mylar 0.033 μF	50V	±10 %
C17,18 19,20	C1HCDK471SL	Ceramic 470pF	50V	±10 %
C21,22	C1HCDK820SL	Ceramic 82pF	50V	±10 %
C23,24	C1HRB-105A	Electrolytic 1 μF	50V	
C25,26 27,28	C1HRE-105AL	Electrolytic 1 μF	50V	
C29,30	C1HRB-106A	Electrolytic 10 μF	50V	
C31,32	C1HRB-107A	Electrolytic 100 μF	50V	
	SEMICONDUCTORS			
D01	DDD-S1RBA20	Diode Bridge S1RBA20		
D02,03	DNN-RD39E	Diode RD39E		
IC01	IJJ-NJM4558D	IC NJM4558D-D		
Q01	2035 8220 33050	TR 2SD330E		
Q02	2035 6460 51450	TR 2SB514E		
Q03,04	TNN-2SC1400-E	TR 2SC1400E		
	RESISTORS			
R01,02 03,04	R2EDSJ224A	Carbon 220k	1/4W	±5 %
R05,06	R2EDSJ273A	Carbon 27k	1/4W	±5 %
R07,08	R2EDSJ103A	Carbon 10k	1/4W	±5 %
R09,10	R2EDSJ224A	Carbon 220k	1/4W	±5 %
R11,12 13,14	R2EDSJ682A	Carbon 6.8k	1/4W	±5 %
R15,16 17,18	R2EDSJ153A	Carbon 15k	1/4W	±5 %
R19,20	R2EDSJ273A	Carbon 27k	1/4W	±5 %
R21,22	R2EDSJ102A	Carbon 1k	1/4W	±5 %
R23,24	R2EDSJ105A	Carbon 1M	1/4W	±5 %
R25,26	R2EDSJ224A	Carbon 220k	1/4W	±5 %
R27,28	R2EDSJ682A	Carbon 6.8k	1/4W	±5 %
R29,30 31,32 33,34	R2EDSJ474A	Carbon 470k	1/4W	±5 %
R35,36	R2EDSJ222A	Carbon 2.2k	1/4W	±5 %
R37,38	R2HZPK100A	Fuse 10	1/2W	±5 %

RECOMMENDED TEST EQUIPMENT

The following test equipment is recommended to completely test and align the Amplifier:

- Line Voltage Isolation Transformer.
- AC DC Multimeter.
- Accurately Calibrated AC Voltmeter.
- Oscilloscope (Flat to 100 kHz Minimum)
- Low-Distortion Audio Sine-Wave Generator
- Harmonic Distortion Analyzer
- Two (2) Load Resistors, 8-ohms, 250 Watts (Minimum Rating)
- Low-Distortion AM-FM Signal Generator
- 10.7 MHz Sweep Generator
- Multiplex Generator
- 455 kHz Sweep Generator

HARMONIC DISTORTION TEST

CAUTION: Limit the following tests to no more than ten minutes each. Use 8-ohm resistors with a minimum power rating of 250 watts when connecting a load across the SPEAKERS terminals.

CONTROL SETTINGS:

Unplug the AC power cord and set the front panel controls as follows:

BASS, TREBLE, and BALANCE controls to center positions

POWER switch to OFF

SPEAKERS switch to OFF

FUNCTION switch to AUX

MODE switch to STEREO

MONITOR switch to SOURCE

DUPLICATE switch to OFF

LOW FILTER, MUTING and LOUDNESS switches to OFF

TONE and TURN OVER push buttons out (not depressed)

VOLUME control to MINIMUM position

LEFT CHANNEL DRIVEN

ONE CHANNEL DRIVEN:

1) Connect a low distortion audio generator to LEFT AUX IN jack. Set generator frequency to 1 kHz and output to minimum.
2) Connect an 8-ohm load resistor between SPEAKERS MAIN LEFT and COM terminals.
   Connect a Harmonic Distortion analyzer and an AC VTVM in parallel across the 8-ohm load.
3) Connect the AC power cord and set SPEAKERS switch to MAIN. Turn VOLUME control to MAX.
4) Increase generator output for 70 Watts RMS (23.67 V across the 8-ohm load). Harmonic Distortion Analyzer should measure 0.05 % distortion or less.
5) Repeat steps 1 through 4 for RIGHT CHANNEL.

BOTH CHANNELS DRIVEN

Connect 8-ohm load resistors across LEFT and RIGHT MAIN SPEAKERS terminals. Set MODE switch to "MONO". Adjust generator output and "BALANCE" control for 70 Watts at Left and Right Channels (23.67 Volts across the 8-ohm loads). Harmonic Distortion Analyzer should measure 0.05 % distortion or less at each channel.

ADJUSTMENT OF THE POWER AMP. P.C. BOARD

EFORE ADJUSTMENT

Unsolder the PRE OUT/MAIN IN lead.

After the power switch is turned ON, allow a few minutes before making adjustment, to be sure of the most stable operation.

Connect dummy load resistors (8 ohms) to the speaker terminals.

Use a DC V.T.V.M. (Input impedance: More than 50k ohms/V).

(A) IDLING CURRENT ADJUSTMENT

Adjust VR 01 (330 ohm) for an idling current of 35 mA.

Measure the voltage at both sides of R21 resistor(0.47 ohm) and adjust VR01 (330 ohm) to indicate 0.018V ±0.001V.

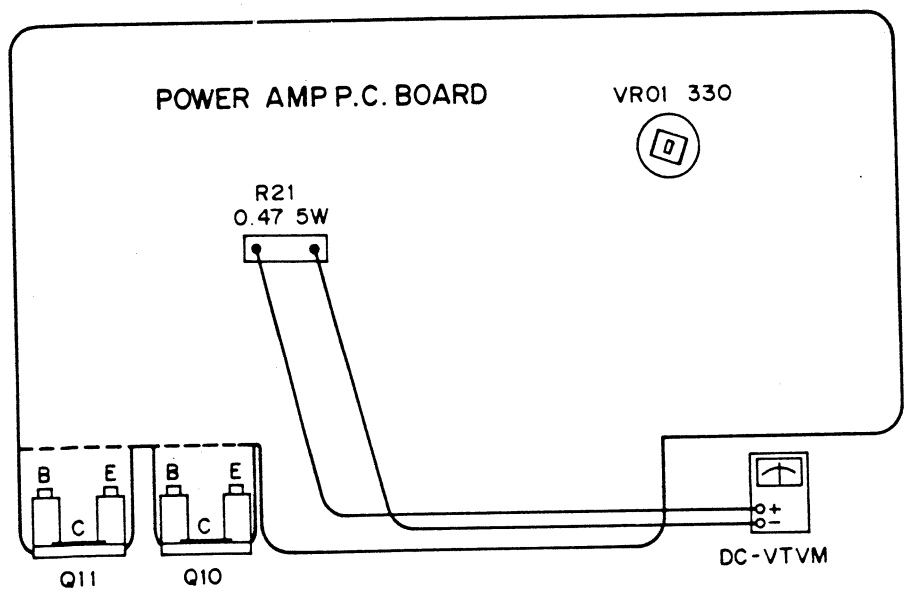
Note: Polarity of Emitter of Q10 is (+).

Mid-point is (−).

(B) Repeat steps A for optimum results.

Note: a. Turn the semi-fixed variable resistor slowly during adjustment.

b. Be careful of the polarity of each measurement point.



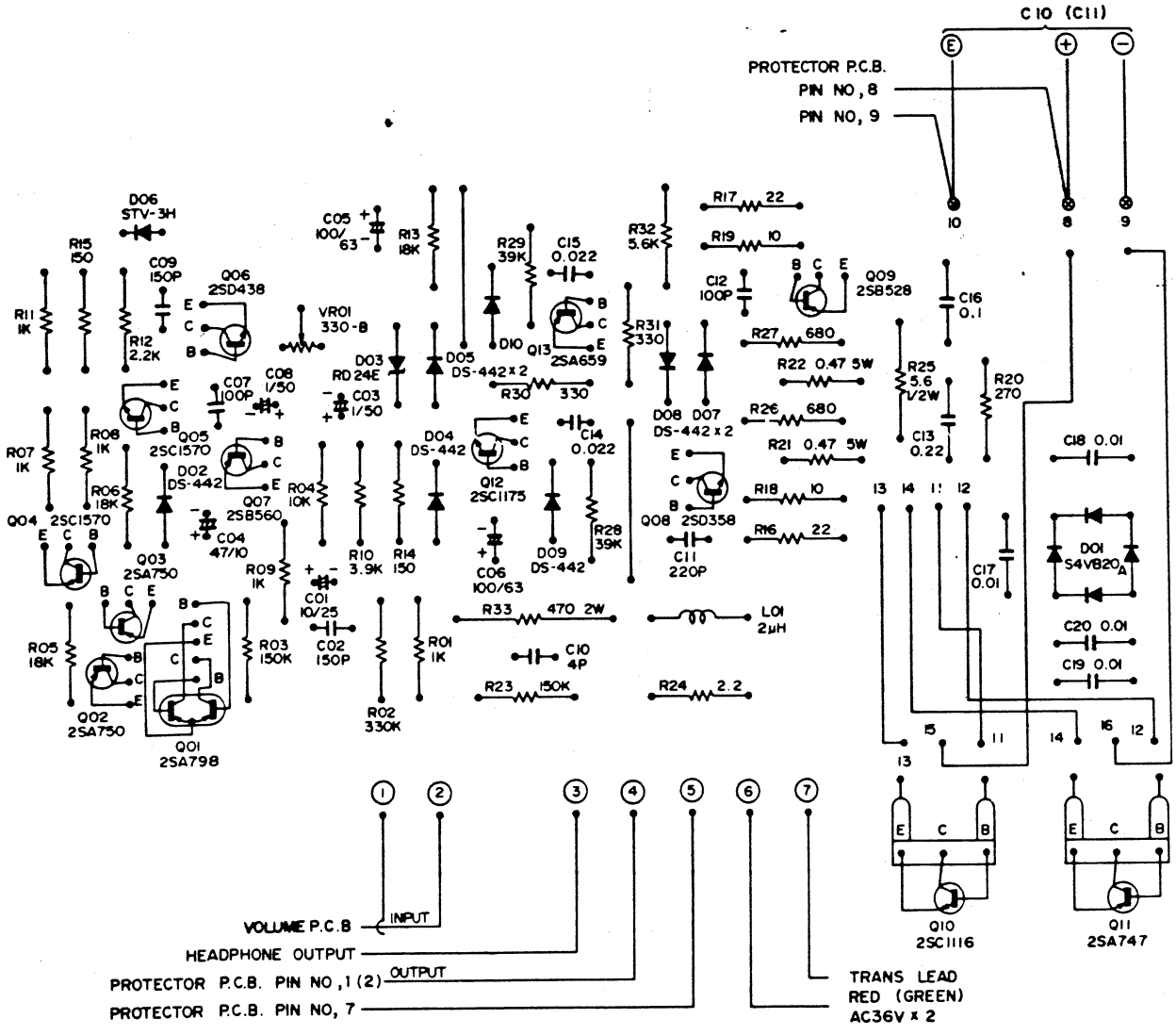
EXPLANATION OF PROTECTIVE CIRCUITS

*For about two seconds after the power switch is turned on, the speakers remain silent because the power muting circuit operates during this time.

*If this unit is operated with speakers of 4 ohm or less, or by being operated to drive two pairs of speakers of 8 ohm or less simultaneously, its power limitter will start to operate.
If under these conditions the volume is raised to a high level the sound from the speakers may be distorted

*If the speaker terminals are short-circuited or the ventilatior. holes at the cabinet top are blocked during long periods of operation, the internal temperature may rise abnormally. At about 100°C, the thermal sensor (temperature detection) circuit becomes activated and will interrupt the signal. If the cause is removed and the internal temperature is back to normal, the unit automatically resets itself to restore normal operation.

POWER AMP P.C.BOARD



SEMICONDUCTORS FRONT VIEW

BOTTOM VIEW

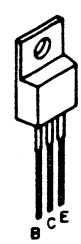
D06 STV-3H

Q06 2SD438
Q07 2SB560

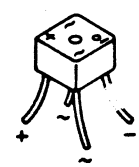
Q02,03 2SA750(1)
Q04,05 2SC1570
Q12 2SC1175
Q13 2SA659

D02,04 DS442
05,07~10
D03 RD-24E

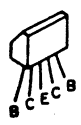
Q09 2SB528
Q08 2SD358



D01 S4VB20



Q01 2SA798



Q11 2SA747
Q10 2SC1116

PARTS LIST

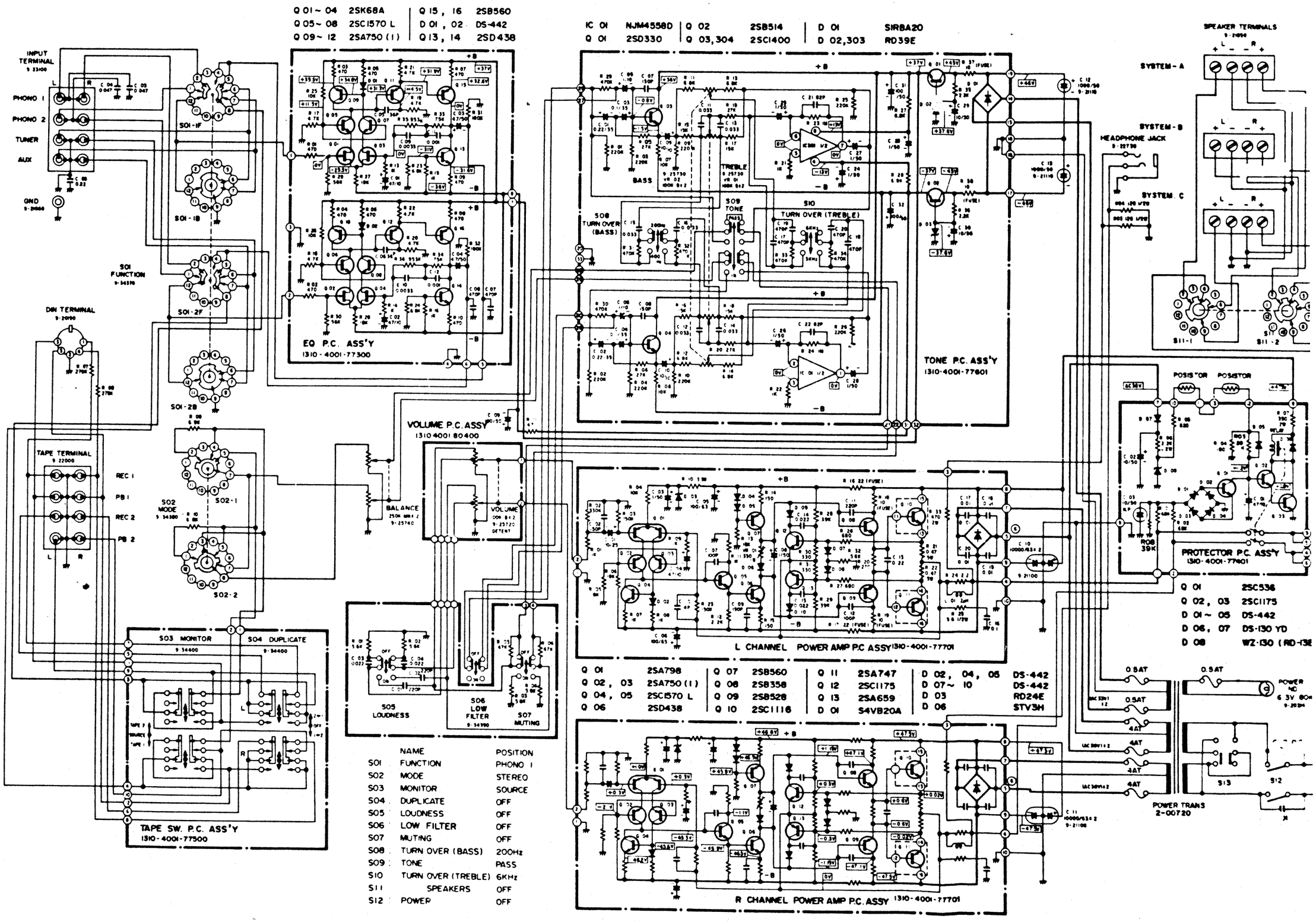
POWER AMP PCB Assy
1310 4001 77701

Ref. No.	Parts Number	Description
L01	4 2539 20280	Coil Phase Compens 2 μH
VR01	4 2229 25500	VR 330
	4 2359 23090	Socket
	4 2379 20330	Terminal Lug 2P
	HLL-PTH487A-B	Posistor 100°C
	CAPACITORS	
C01	C1ERE-106AL	Electrolytic 10 μF 25V
C02	C1HCDK151SL	Ceramic 150pF 50V ±10 %
C03	C1HRB-105A	Electrolytic 1 μF 50V
C04	C1ARE-476AL	Electrolytic 47 μF 10V
C05,06	4 2239 21120	Electrolytic 100 μF 63V
C07	C1HCDK101SL	Ceramic 100pF 50V ±10 %
C08	C1HRE-105AL	Electrolytic 1 μF 50V
C09	C1HCDK151SL	Ceramic 150pF 50V ±10 %
C10	C1HCSC040CH	Ceramic 4pF 50V ±0.25 %
C11	C1HCDK221SL	Ceramic 220pF 50V ±10 %
C12	C1HCDK101SL	Ceramic 100pF 50V ±10 %
C13	C1HFRM224A	Mylar 0.22 μF 50V ±20 %
C14,15	C1HFRM223A	Mylar 0.022 μF 50V ±20 %
C16	C1HFRM104A	Mylar 0.1 μF 50V ±20 %
C17,18 19,20	C2HYDP103A	Ceramic 0.01 μF 500V +100,–0 %
	SEMICONDUCTORS	
D01	DDD-S4VB20A	Bridge Diode S4VB20A
D02	2055 9040 44210	Diode DS-442
D03	DNN-RD24E	Zener Diode RD24E
D04,05	2055 9040 44210	Diode DS-442
D06	DAA-STV-3H--W	Diode STV-3H
D07,08 09,10	2055 9040 44210	Diode DS-442
Q01	TMM-2SA798--F	TR 2SA798F
Q02,03	TNN-2SA7501-E	TR 2SA750 (1) E
Q04,05	2035 5151 57079	TR 2SC1570LG
Q06	2035 6920 43850	TR 2SD438E
Q07	2035 6930 56050	TR 2SB560E
Q08	TMM-2SD358--D	TR 2SD358D
Q09	TMM-2SB528--D	TR 2SB528D
Q10	TTA-2SC1116-0	TR 2SC1116
Q11	TTA-2SA747–0	TR 2SA747
Q12	2035 6701 17550	TR 2SC1175E
Q13	2035 6800 65950	TR 2SA659E

Ref. No.	Parts Number	Description
	RESISTORS	
R01	R2EDSJ102A	Carbon 1k 1/4W ±5 %
R02	R2EDSJ334A	Carbon 330k 1/4W ±5 %
R03	R2EDSJ154A	Carbon 150k 1/4W ±5 %
R04	R2EDSJ103A	Carbon 10k 1/4W ±5 %
R05,06	R2EDSJ183A	Carbon 18k 1/4W ±5 %
R07,08 09,11	R2EDSJ102A	Carbon 1k 1/4W ±5 %
R10	R2EDSJ392A	Carbon 3.9k 1/4W ±5 %
R12	R2EDSJ222A	Carbon 2.2k 1/4W ±5 %
R13	R2EDSJ183A	Carbon 18k 1/4W ±5 %
R14,15	R2EDSJ151A	Carbon 150 1/4W ±5 %
R16,17	R2HZPK220A	Fuse 22 1/2W ±10 %
R18,19	R2HZPK100A	Fuse 10 1/2W ±10 %
R20	R2EDSJ271A	Carbon 270 1/4W ±5 %
R21,22	4 2219 20030	Metal Plate 0.47 5W
R23	R2EDSJ154A	Carbon 150k 1/4W ±5 %
R24	R2EDSJ2R2A	Carbon 2.2 1/4W ±5 %
R25	R2HCPK5R6A	Solid 5.6 1/2W ±10 %
R26,27	R2EDSJ681A	Carbon 680 1/4W ±5 %
R28,29	R2EDSJ393A	Carbon 39k 1/4W ±5 %
R30,31	R2EDSJ331A	Carbon 330 1/4W ±5 %
R32	R2EDSJ562A	Carbon 5.6k 1/4W ±5 %
R33	R3EXAK471A	Oxide Metal Film 470 2W ±10 %

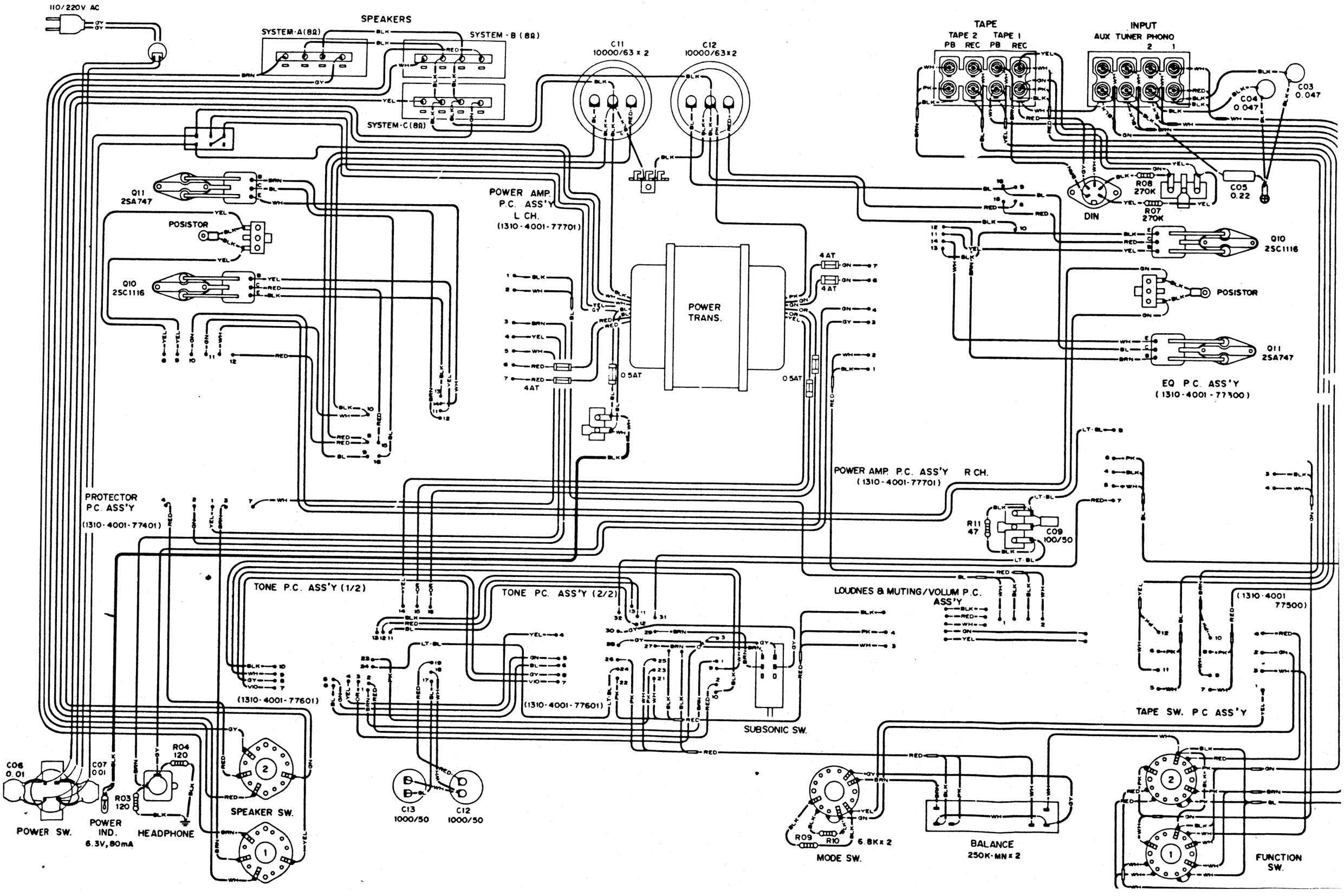
TRANSISTOR DC VOLTAGES				
SYMBOL NO.	DEVICE	B	C	E
Q01	2SA798	+0.3V		1.0V
Q02	2SA750	–21.5V	–45.3V	
Q03	2SA750	–21.5V	–45.6V	
Q04	2SC1570	–45.6V	–45.3V	–46.2V
Q05	2SC1570	–45.3V	–1.1V	–45.9V
Q06	2SD438	–45.9V	–1.15V	–46.5V
Q07	2SB560	+45.9V	+1.15V	+46.5V
Q08	2SB358	+1.15V	+47.1V	+0.6V
Q09	2SB528	–1.15V	–47.1V	–0.6V
Q10	2SC1116	+0.6V	+47.5V	0.02V
Q11	2SA747	–0.6V	–47.5V	
Q12	2SC1175	+0.3V	+9.0V	
Q13	2SA659	–0.3V	–9.0V	

SCHEMATIC DIAGRAM

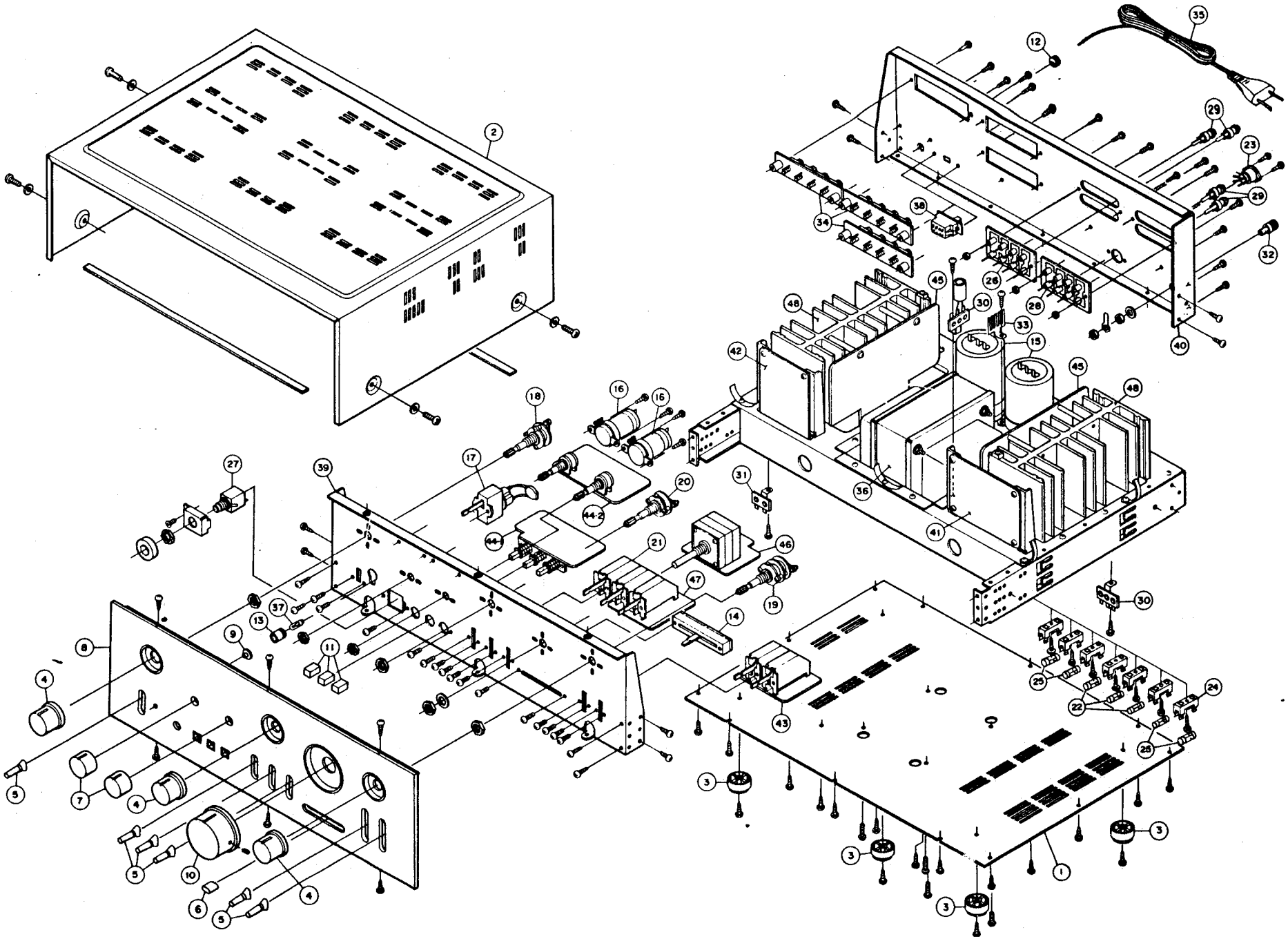


	NAME	POSITION
SO1	FUNCTION	PHONO 1
SO2	MODE	STEREO
SO3	MONITOR	SOURCE
SO4	DUPLICATE	OFF
SO5	LOUDNESS	OFF
SO6	LOW FILTER	OFF
SO7	MUTING	OFF
SO8	TURN OVER (BASS)	200Hz
SO9	TONE	PASS
SIO	TURN OVER (TREBLE)	6KHz
SII	SPEAKERS	OFF
SI2	POWER	OFF

POINT TO POINT WIRING DIAGRAM



EXPLODED VIEW OF CABINET AND CHASSIS



PARTS LIST

Ref. No.		Parts Number	Description
CABINET PARTS LIST			
1		1312 1105 18401	Plate Bottom
2		1312 1410 16201	Cover
3		1312 1801 13300	Leg
APPEARANCE PARTS LIST			
4		1310 1001 37500	Knob Assy (Function/Mode/ Speakers)
5		1310 1001 37600	Knob Assy (Low Filter/Muting/ Loudness)
6		1310 1001 37700	Knob Assy (Balance)
7		1310 1001 37800	Knob Assy (Bass/Treble)
8		1310 1016 23901	Dress Panel
9		1312 1503 12201	Decorate Sign
10		1312 1601 42700	Knob (Volume)
11		1312 1601 42800	Knob (Push Buttons)
CHASSIS & ELECTRICAL PARTS LIST			
12		1312 6111 14200	Bushing (Line Corde)
13		1312 6111 11601	Housing (Power IND)
14		4 2229 25740	VR 250k (Balance)
15(C10,11)		4 2239 21100	Capacitor Electrolytic 10000 μFx2 63V
16(C12,13)		4 2239 21100	Capacitor Electrolytic 1000 μF 50V
17		4 2319 24382	SW Lever 4P (Power)
18		4 2319 34141	SW Rotary (Speakers)
19		4 2319 34370	SW Rotary (Function)
20		4 2319 34380	SW Rotary (Mode)
21		4 2319 34390	SW Lever 6P (Low Filter)
22		4 2349 20310	Fuse 0.5A (AC Line)
23		4 2359 20190	Socket 5P (DIN)
24		4 2359 21021	Fuse Holder
25		4 2349 20590	Fuse 4A
26		4 2359 22000	Socket 8P (Accessory Jack)
27		4 2359 22730	Jack Head Phones
28		4 2359 23100	Socket 8P (Accessory Jack)
29	*	4 2369 20561	Plug 1P
30		4 2379 20140	Terminal Lug 2P
31		4 2379 20250	Terminal Lug 1-1PL
32	*	4 2379 21060	Terminal Screw GND
33	*	4 2379 21840	Terminal GND
34		4 2379 21850	Terminal 4P (Speaker Connector)
35		4 2439 20721	Line Cord
36		4 2512 00720	Power Transformer
37		4 6129 20214	Pilot Lamp 6.3V 80mA
38		4 2319 21531	Switch Slide 6P
39	*	1312 3305 21500	Panel Front
40	*	1312 3306 23505	Panel Rear
41	*	1310 4001 77300	EQ AMP P.C. Assy
42	*	1410 4001 77401	Protector P.C. Assy
43	*	1310 4001 77500	Tape Switch P.C. Assy
44	*	1310 4001 77601	Tone AMP P.C. Assy
44-1	*		Tone & Turnover Switch P.C.Board
44-2	*		Tone AMP P.C.B.
45	*	1310 4001 77701	Power AMP P.C. Assy
46	*	1310 4001 80400	Volume P.C. Assy
47	*	1310 4001 80500	Loudness & Muting P.C. Assy
48	*	1312 6201 23501	Plate Heat Sink
C03,04		C1HYDZ473A	Capacitor Ceramic 0.047 μF 50V +80,–20 %
C05		C1HFRM224A	Capacitor Mylar 0.22 μF 50V ±20 %
C06,07		C2HYDP103A	Capacitor Ceramic 0.01 μF 500V +100,–0 %
C09		C1HRE-107A	Capacitor Electrolytic 100 μF 50V
R03,04		R2HDPJ121A	Resistor Carbon 120 1/2W ±5 %
R07,08		R2EDPJ274A	Resistor Carbon 270k 1/4W ±5 %
R09,10		R2EDPJ682A	Resistor Carbon 6.8k 1/4W ±5 %
R11		R2EDPJ470A	Resistor Carbon 47 1/4W ±5 %

NOTE: * Asterisk indicates not a service part.